Overview of Environmental Medicine

Aaron L. Hilliard, Ph.D., Director
Environmental Health & Safety
Duval County Health Dept.

What is Environmental Medicine?

- Environmental Medicine focuses on the person and the environment.
- Emphasizes:
  - Identification
  - Diagnosis
  - Treatment
  - Prevention

Environmental Medicine

- There are four types of environmental media
  - Air
  - Water
  - Soil
  - Food

The Media of Environmental Hazards

- Air, water and food are the major environmental media or vectors.
- Incineration is also a major source of exposure.

The Media of Environmental Hazards

- Soil is often overlooked as a route of exposure.
- Home gardens may be an exposure route.

The Discipline of Environmental Medicine

- A broad discipline involving:
  - Understanding the impact of the environment on human health
  - Eliciting appropriate exposure history
  - Recognizing exposure-related diseases
  - Identifying and Accessing resources
  - Discuss environmental risks to patients
  - Treating Patients

How do chemicals enter the environment?

- There are six ways in which hazardous substances can enter the environment.
  - Direct exposure
  - Direct discharge
  - Inadequate landfills
  - Illegal Dumping
  - Catastrophic events
  - Ecological catastrophic events

Environmental hazards cont…

- The major environmental hazards and their relative importance in various environmental settings.
  - Chemical agents: pesticides, VOC'S, and PCB'S
  - Physical agents: ionizing and nonionizing radiation, vibration, temperature, and noise.
  - Biological agents: infectious and allergic disorders

Interaction between hazardous exposures and humans

- Four characteristics critical to exposure assessment:
  - Route (Inhalation, Ingestion, Dermal)
  - Magnitude (Concentration or Dose)
  - Duration (Minutes, Hours, Days, Lifetime)
  - Frequency (Daily, Weekly, Monthly, Seasonally)

Interaction between hazardous exposures and humans cont…

- All of the environmental media are possible exposure routes.
- Humans have access to environmental toxicants by contaminated food, drinking contaminated water, and breathing contaminated air.
- Hazardous pollutants may also enter the human body through the skin or a combination of these routes.

Relationship of magnitude, duration, and frequency

- The concept of “dose” in environmental medicine is a function of the amount of the toxicant absorbed and time factors.
- A toxicant may be present in very low, perhaps minute concentrations,and stimulate biological responses in the host.
- Even a very small concentration of a highly toxic substance can cause a significant clinical response.

Environmental Medicine and Human Health

- Environmental medicine plays two major roles in human health.
  - Provides the diagnosis and treatment of health complaints attributable to the environment.
  - Contributes to a much broader understanding of the unity of human health and environmental quality.

Recognition of Human Hazardous Exposures

- The only way to accurately determine to what extent persons come in contact with a specific environmental hazardous pollutant is to actually measure the exposure.
- There are three ways to accomplish this:
  - Use of micro-environmental samplers
  - Use of personal monitors
  - Use of biologic measurements in human tissue

Children's Environmental Health

- Environmental health is an ongoing concern within the pediatric clinical practice.
- Children live in a very different environment today than previous generations.
- Advancements in information technology have contributed to the discovery and use of thousands of new chemicals.
- Unlike our pharmaceutical drugs, many of the 70,000 chemicals used in the U.S. have not been tested for safety when exposed to humans.

Children's Environmental Health

- Developing Organ Systems
  - Environmental toxicants can cause permanent damage to developing nervous, immune, and respiratory systems.
- Biological Sensitivity
  - Children’s skin, respiratory and gastrointestinal absorption is greater than adults.

Children's Environmental Health

- Behavior
  - Hand-to-mouth activity and crawling can increased probability of exposure to toxicants.
- Diet
  - Children eat more pound for pound than adults. So they will absorb more hazardous residues in food.

Environmental Justice

- All children are affected by environmental hazards.
- Pollution and environmental degradation recognize no county, state, regional, or national border.
- Children living in poverty and children in racial or ethnic communities are at disproportionate risk for exposure to environmental hazards.

Environmental Justice

- Poverty can compound the adverse effects of exposure to toxicants such as:
  - Inadequate Housing
  - Poor Nutrition
  - Limited access to health care

Known Hazards for Children

- Children face many different environmental hazards including:
  - Radiation
  - Solvents
  - Asbestos
  - Mercury
  - Arsenic
  - Sulfur Dioxide and Ozone.

Environmental Medicine

- Various diseases encountered in environmental medicine are:
  - Contact Dermatitis
  - Obstructive Lung Disease
  - Nephritis
  - Neuropathy
  - Various Cancers

Outcomes from environmental hazards

- Carcinogenicity
- Heritable genetic & chromosomal mutation
- Developmental
- Reproductive
- Neurotoxicity
- Benzene, PAH'S
- Ionizing radiation
- Lead, MethylImercury
- Benzo[a]pyrene
- Organophospha te

Known Hazards for Children

- They fall into categories such as:
  - Neurotoxins
  - Endocrine Disruptors
  - Carcinogens
  - Respiratory Irritants and Inflammatants.

Known Hazards for Children

- The following are three selected environmental hazards known to seriously impact children's health.
  - Lead
  - Air Pollution
  - Pesticides

Conclusion

- Environmental medicine is the clinical arm of environmental health.
- Involves diagnosis and prevention of illness caused or influenced by external agents in a persons environment.
- Once an environmental disease has occurred, it's treatment is often within the domain of internal medicine, but it's recognition and prevention is the essence of the environmental health practice.
- Once a hazard has been recognized, control, and reduction of exposure should follow swiftly.

References & Resources

- American Academy of Pediatrics, Handbook of Pediatric Environmental Health
- ATSDR Case Studies in Environmental Medicine
- U.S. Department of Health and Human Services, Public Health Services Washington, D.C.
- Environmental Health Perspectives Volume 110, Number 8, August 2002

References & Resources

- The Institute of Medicine (IOM) 1995 report
- Environmental Medicine: Investigating a Missing Element into Medical Education, Nursing, Health, and the Environment.
- Pediatric Environmental Health Units.
- Environmental Medicine Brooks, Stuart, Gochfeld, Michael, Herzstein, Jessica, Jackson, Richard